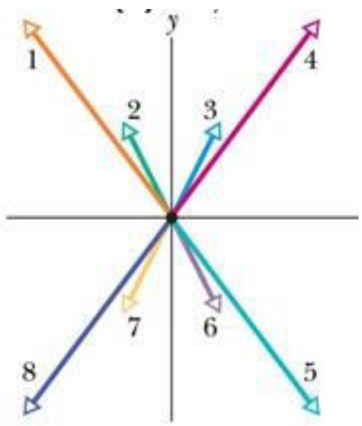
Chapter 05, Concept Question 02

Two horizontal forces,
F1 = (3N)I – (4n)J and Vector F2 = -(1N)I – (2N)J
pull a banana split across a frictionless lunch counter. Without using a calculator, determine which of the vectors in the freebody diagram of the figure best represent **(a)**Vector F1 and **(b)**Vector F2. What is the net-force component along **(c)** the *x* axis and **(d)** the *y* axis? Into which quadrants do **(e)** the net-force vector and **(f)** the split's acceleration vector point?



a. 5
b. 7
c. 2N
d. -6N
e. X>0, Y<0
f. X>0, Y<0

Chapter 05, Concept Question 04

At time t = 0, constant force Vector F begins to act on a rock moving through deep space in the +x direction.
Three possible functions of its motion are:
(1) $x = 4t - 3$
(2) $x = -4t^2 + 6t - 3$
(3) $x = 4t^2 + 6t - 3$

(a) For time $t > 0$, which are possible functions $x(t)$ for the rock's position?

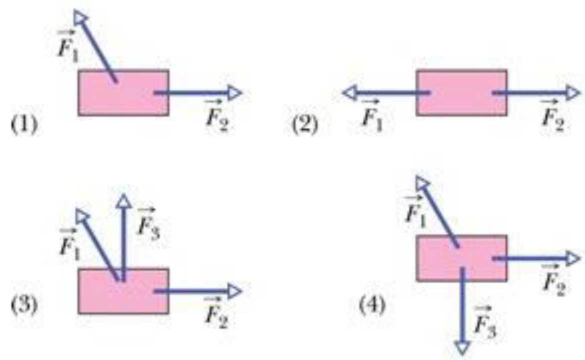
- [ ] (1) $x = 4t - 3$
- [x] (2) $x = -4t^2 + 6t - 3$
- [x] (3) $x = 4t^2 + 6t - 3$

(b) For which function is $\vec{F}$ directed opposite the rock's initial direction of motion?

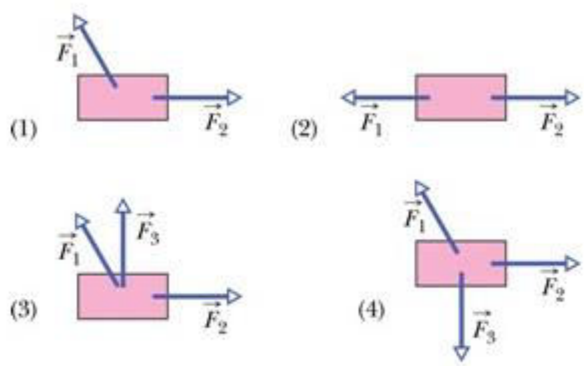
- [ ] (1) $x = 4t - 3$
- [x] (2) $x = -4t^2 + 6t - 3$
- [ ] (3) $x = 4t^2 + 6t - 3$

Chapter 05, Concept Question 05

The figure shows overhead views of four situations in which forces act on a block that lies on a frictionless floor. If the force magnitudes are chosen properly, in which situations is it possible that the block is **(a)** stationary and **(b)** moving with a constant velocity?

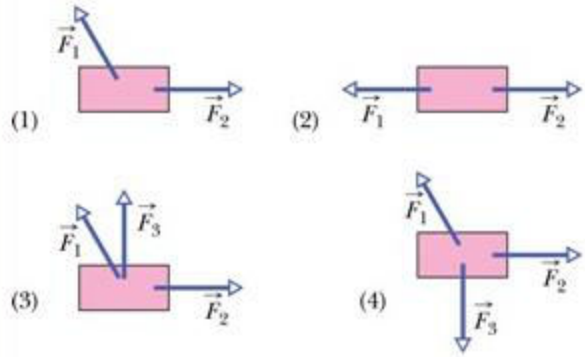


(a) The block is stationary.



- [ ] (1)
- [x] (2)
- [ ] (3)
- [x] (4)

(b) The block is moving with a constant velocity.

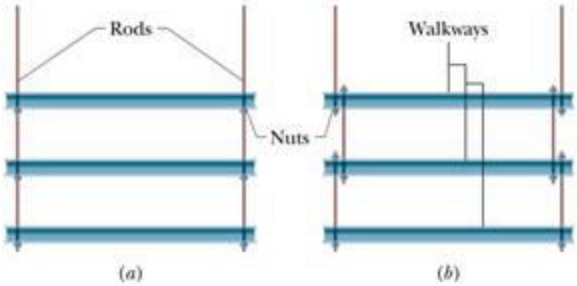


- [ ] (1)
- [x] (2)
- [ ] (3)
- [x] (4)

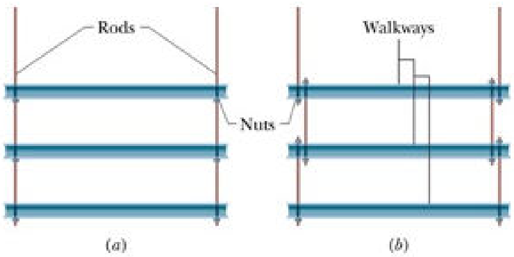
Chapter 05, Concept Question 07

July 17, 1981, Kansas City: The newly opened Hyatt Regency is packed with people listening and dancing to a band playing favorites from the 1940s. Many of the people are crowded onto the walkways that hang like bridges across the wide atrium. Suddenly two of the walkways collapse, falling onto the merrymakers on the main floor.

The walkways were suspended one above another on vertical rods and held in place by nuts threaded onto the rods. In the original design, only two long rods were to be used, each extending through all three walkways (Figure (*a*)). Each walkway and the merrymakers on it have a combined mass of *M.* Threading nuts on a rod is impossible except at the ends, so the design was changed: Instead, six rods were used, each connecting two walkways (Figure (*b*)). It was this design that failed.

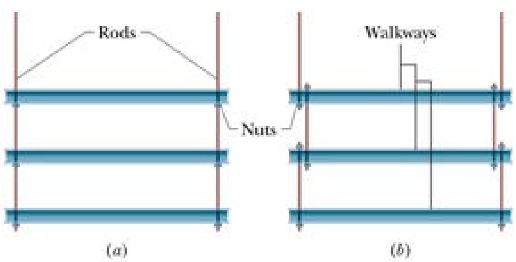


(a) In the original design, what is the total mass supported by the threads and two nuts on the lowest walkway?



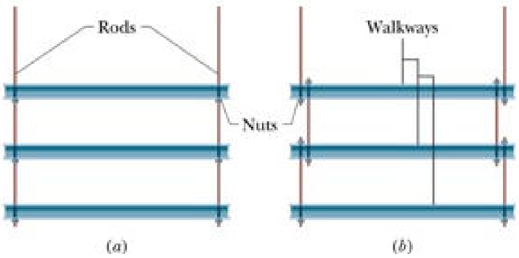
- M
- $2M$
- $3M$

(b) In the original design, what is the total mass supported by the threads and two nuts on the highest walkway?



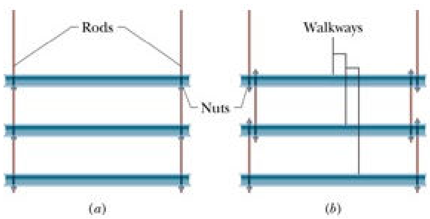
- M
- $2M$
- $3M$

(c) In the revised design, what is the total mass supported by the threads and two nuts on the lowest walkway?



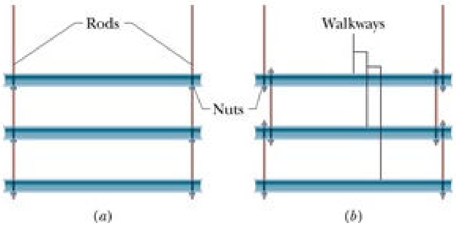
- ( ) M
- ( ) $2M$
- ( ) $3M$

(d) In the revised design, what is the total mass supported by the threads and two nuts on the upper side of the highest walkway?



- ( ) M
- ( ) $2M$
- ( ) $3M$

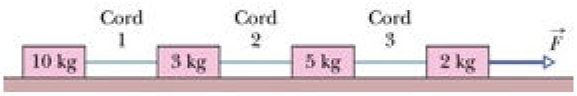
(e) In the revised design, what is the total mass supported by the threads and two nuts on the lower side of the highest walkway?



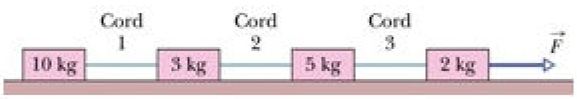
- M
- $2M$
- $3M$

Chapter 05, Concept Question 09

The figure shows a train of four blocks being pulled across a frictionless floor by force vector F.



(a) What total mass is accelerated to the right by force $\vec{F}$?

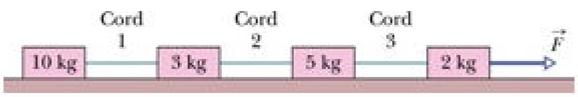


- 2 kg
- 7 kg
- 10 kg
- 20 kg

(b) What total mass is accelerated to the right by cord 3?

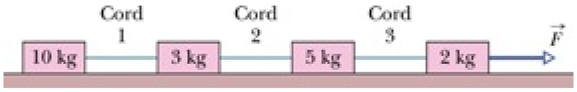
- 2 kg
- 5 kg
- 8 kg
- 18 kg

(c) What total mass is accelerated to the right by cord 1?



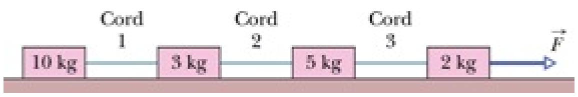
- 3 kg
- 8 kg
- 10 kg
- 20 kg

(d) Rank the blocks according to their accelerations, greatest first.



- (10 kg block) > (3 kg block) > (5 kg block) > (2 kg block)
- (2 kg block) > (5 kg block) > (3 kg block) > (10 kg block)
- (10 kg block) > (5 kg block) > (3 kg block) > (2 kg block)
- (2 kg block) > (3 kg block) > (5 kg block) > (10 kg block)
- (10 kg block) = (3 kg block) = (5 kg block) = (2 kg block)

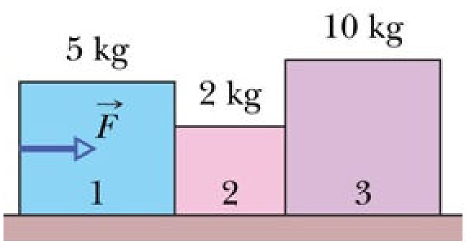
(e) Rank the cords according to their tension, greatest first.



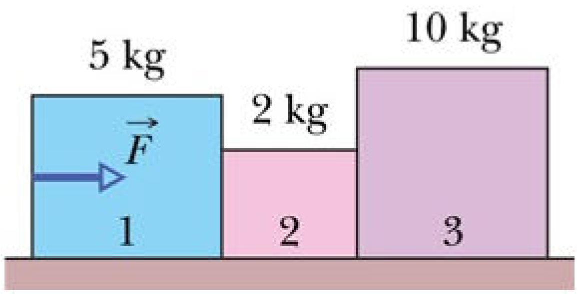
- (cord 1) > (cord 2) > (cord 3)
- (cord 3) > (cord 2) > (cord 1)
- (cord 1) = (cord 2) = (cord 3)

Chapter 05, Concept Question 10

The figure shows three blocks being pushed across a frictionless floor by horizontal force . Force vector F. Vector F21 is the force on block 2 from block 1. Force Vector F32 is the force on block 3 from block 2.

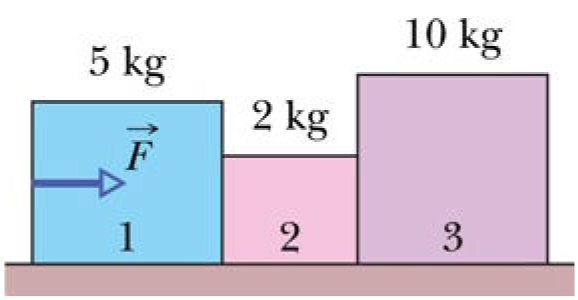


(a) What total mass is accelerated to the right by force $\vec{F}$?



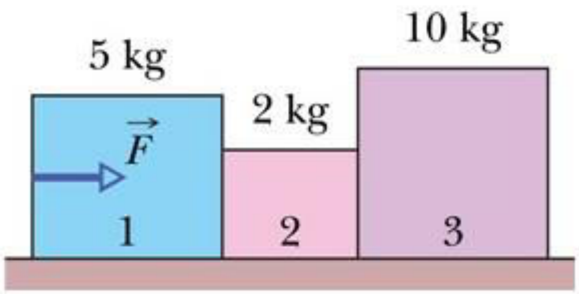
- 5 kg
- 7 kg
- 17 kg

(b) What total mass is accelerated to the right by force F_{21} ?



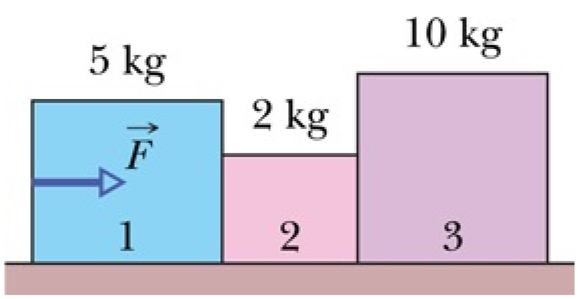
- 2 kg
- 5 kg
- 12 kg
- 17 kg

(c) What total mass is accelerated to the right by force $\vec{F}_{32}$?



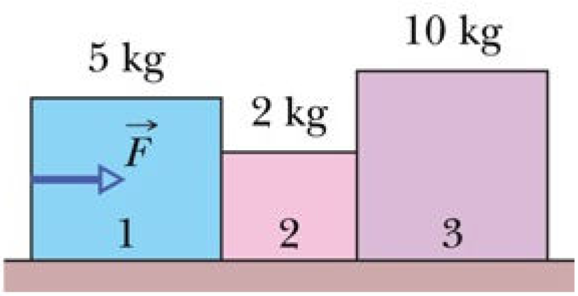
- 7 kg
- 10 kg
- 17 kg

(d) Rank the blocks according to their acceleration magnitudes, greatest first.



- Block 2 > Block 1 > Block 3
- Block 1 > Block 2 > Block 3
- Block 3 > Block 1 > Block 2
- Block 1 = Block 2 = Block 3
- Block 3 > Block 2 > Block 1

Rank forces $\vec{F}$, $\vec{F}_{21}$, and $\vec{F}_{32}$ according to magnitude, greatest first.



- $F > F_{21} > F_{32}$
- $F_{21} > F > F_{32}$
- $F_{32} > F_{21} > F$
- $F_{32} > F > F_{21}$